

Winter 2008/2009 Climate Summary For Southwest Lower Michigan

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The 2008/2009 winter season was cold, wet and snowy. This was the fifth consecutive winter with above average precipitation. It was the first winter to be colder than normal since the winter of 2002/2003. Snowfall was well above normal across Southwest Lower Michigan for the second consecutive winter. Four of the last five winters recorded above normal snowfall over most the Southwest Lower Michigan.

There were fourteen winter storms that brought warning criteria snowfall to Southwest Lower Michigan during the 2008/2009 winter season. This is two more warning criteria winter storms than the twelve-year average of twelve storms per winter season, but still less than the record seventeen winter storm events from the 2007/2008 winter season. Of the fourteen winter storms this past winter, seven were lake effect or lake enhanced and seven were synoptic snow storms. The average for the past twelve years is a nearly even split between synoptic storms and lake enhanced snow events. In that sense, the 2008/2009 winter storm pattern was rather typical.

The first snowstorm of the season hit the lakeshore area from Holland to South Haven on the 17th of November with up to a foot of snow. This was nearly two weeks earlier than the first heavy snowfall event in the 2007/2008 winter season. Once the snow started falling, it fell frequently. From the 30th of November through the 23rd of December, a snowstorm event occurred about every three days.

A storm with very heavy rainfall and near record warm temperatures occurred on the 26th. This storm melted most of the snow cover over all but the northern one third of the area. Temperatures stayed warmer than normal into the first week of January 2009. Starting on the 7th of January, the snow started falling again about every three days through the end of January. This was followed by a two week warm-up during the first two weeks in February, when once again most of the snow melted over all but the extreme northern sections.

Snow started falling again on the 14th of February. A snowstorm brought more than 6 inches in one day to any part of the County Warning Area from the 21st into the 22nd. Snowfall was rather limited in March with no warning class snowstorms. The last major snowstorm of the season was on April 6th, when the southeast part of the Grand Rapids County Warning Area received 4 to 8 inches. By the end of this last snowstorm, most reporting stations in the

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Grand Rapids County Warning Area had well above normal snowfall totals for the second year in a row. Many locations had record or near record snowfall totals and precipitation.

There were two storms in the 2008/2009 winter season that brought heavy rainfall to the Grand Rapids County Warning Area. The first heavy rainfall event occurred on December 26th and the second heavy rainfall event occurred on the 26th of February. Each storm brought more than an inch of precipitation in 24 hours to at least parts of the County Warning Area. Snow was on the ground nearly continuously from mid-December through the end of February, which is unusual considering recent winters.

There were two major flood events. The first was late in December when a surge of warm air and heavy rain melted nearly all of the snow cover in about one day. A similar event occurred the second week in February.

December and January were both colder than normal for the first time since the winter of 1983/1984. The last time Southwest Lower Michigan had a significantly colder winter was the winter of 1993/1994.

TABLE 1. Reported temperature, precipitation and snowfall amounts for the Winter of 2008/2009 at selected climate stations in Southwest Lower Michigan. Normals are computed from 30-year averages from 1971-2000.

Location		Temperature (F)	Precipitation (inches)	Snowfall (inches)
Grand Rapids	<i>Reported</i>	23.8°	11.32	94.5
	<i>Normal</i>	25.0°	6.27	52.1
	<i>Departure</i>	-1.2°	+5.05	+42.4
Lansing	<i>Reported</i>	22.7°	7.17	57.2
	<i>Normal</i>	24.2°	5.23	37.8
	<i>Departure</i>	-1.5°	+1.94	+19.4
Muskegon	<i>Reported</i>	24.5°	13.42	133.0
	<i>Normal</i>	25.8°	6.44	82.0
	<i>Departure</i>	-1.3°	+6.98	+51.0

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Average Temperature Departure from Mean in Degrees F
December 1, 2008 to February 28, 2009

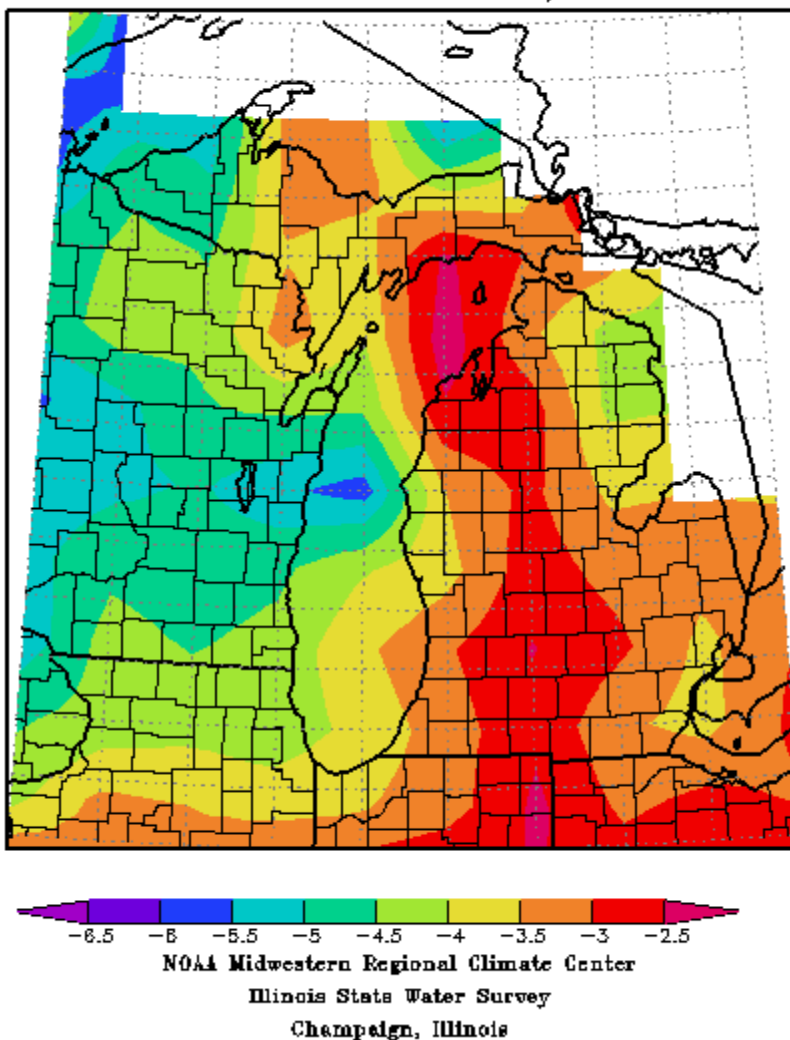


Figure 1. The winter of 2008/2009 daily mean temperature departure from normal.

The area averaged winter mean temperature was 22.3°F, which was 2.3°F colder than the 1971 to 2000 normal. The last winter that was colder than normal over Southwest Lower Michigan was the winter of 2002/2003 (22.8°F, or 1.7°F below normal). Most of Southwest Lower Michigan was between two and four degrees colder than normal (Figure 1). This was 4.0°F colder than the previous four winters averaged together. January was by far the coldest month this past winter and was the coldest month since January of 1994. The mean of December and January was the coldest Southwest Lower Michigan has seen since 1983/1984.

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The relative coldness of the winter of 2008/2009 compared to previous winters is seen in Figure 2. Since 1987 there have been only four colder than normal winters: 1993/1994, 1995/1996, 2002/2003 and 2008/2009. Out of the twenty-three winters since 1986/1987, ten winters were warmer than normal

The coldness of the winter of 2008/2009 can also be seen by looking at the NCDC map which ranks the coldness of the winter by state (Figure 3). Michigan had the 20th coldest winter since records for the states started in 1895. The Great Lakes and the northern Midwest were colder than normal this past winter. Filtered values for Michigan's mean temperature show a trend toward cooler winters, which started in the 1999/2000 winter (Figure 4).

The coldest part of the winter was from the 5th through the 22nd of January when temperatures remained below freezing. This can be seen in the daily temperature graphs for Grand Rapids, Lansing, and Muskegon (Figures 5-7). These figures also show significant thaws just after Christmas and during the second week of February. Both thaws melted most of the snow cover near and south of Route 20. February was the warmest month of the winter and had the least amount of snowfall.

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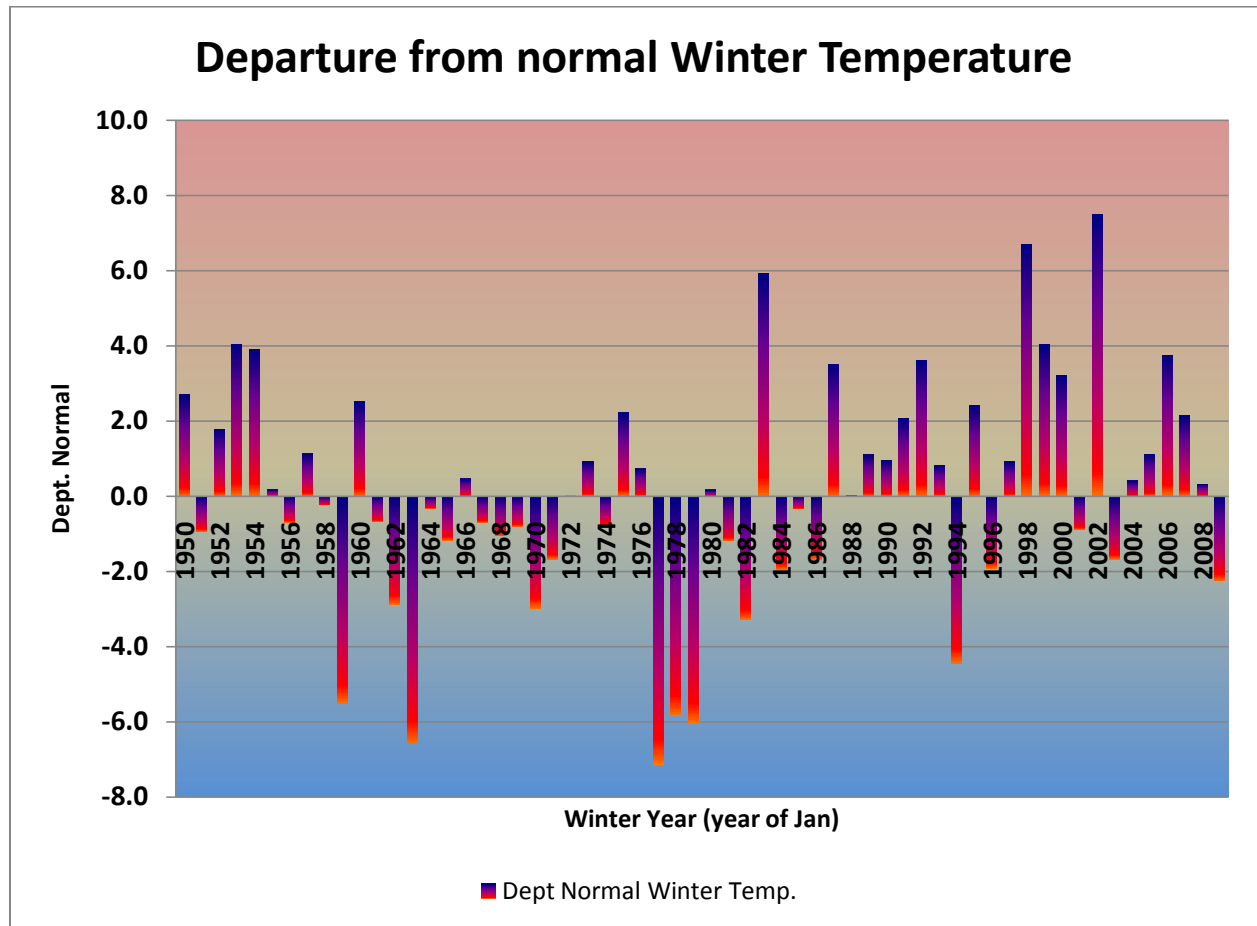


Figure 2. Mean area temperature departure from normal for all of Southwest Lower Michigan, from 1950 through 2009. There were thirty six climate stations used to compute the winter mean temperature.

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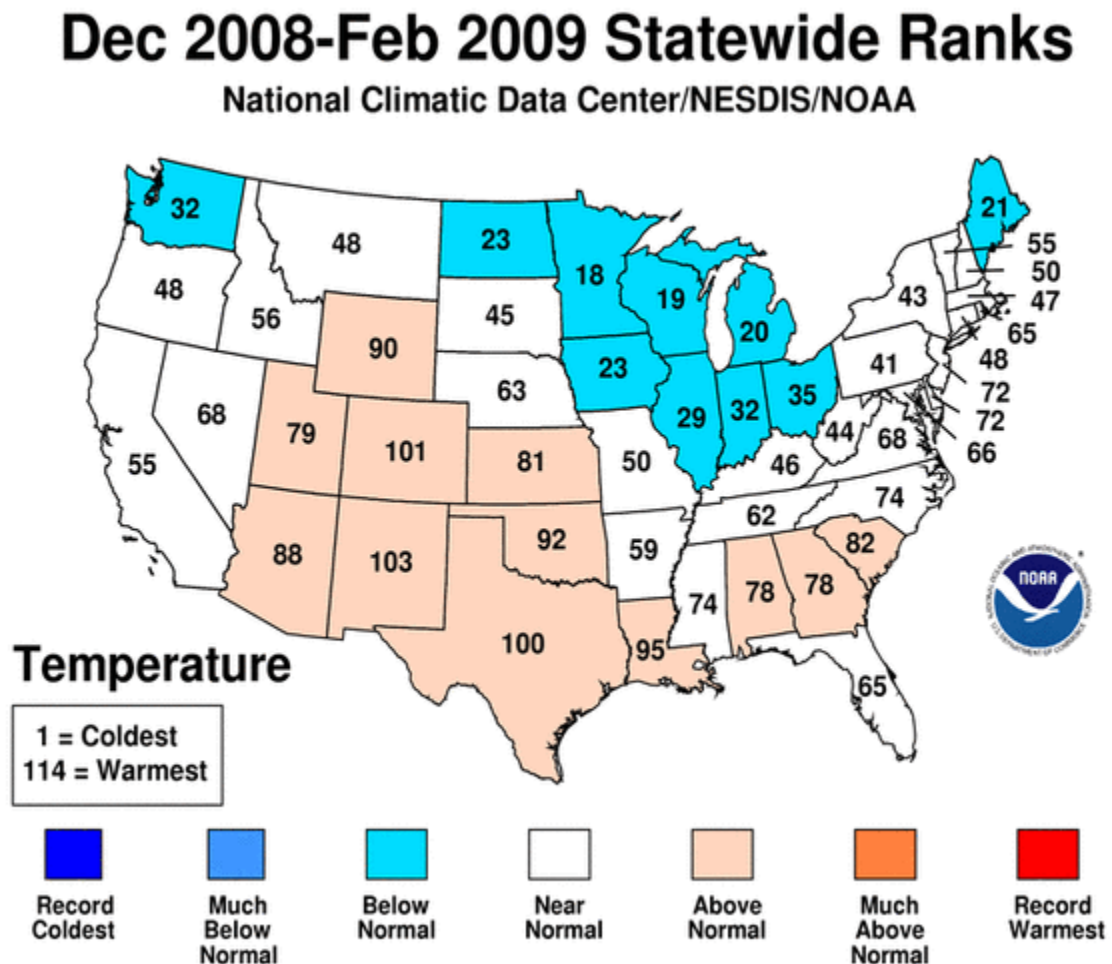


Figure 3. The NCDC state ranking for this past winter. Cold temperatures dominated the weather over the northern Midwest and Great Lakes. Michigan being “20” means it is the 20th coldest winter on record (back to 1895).

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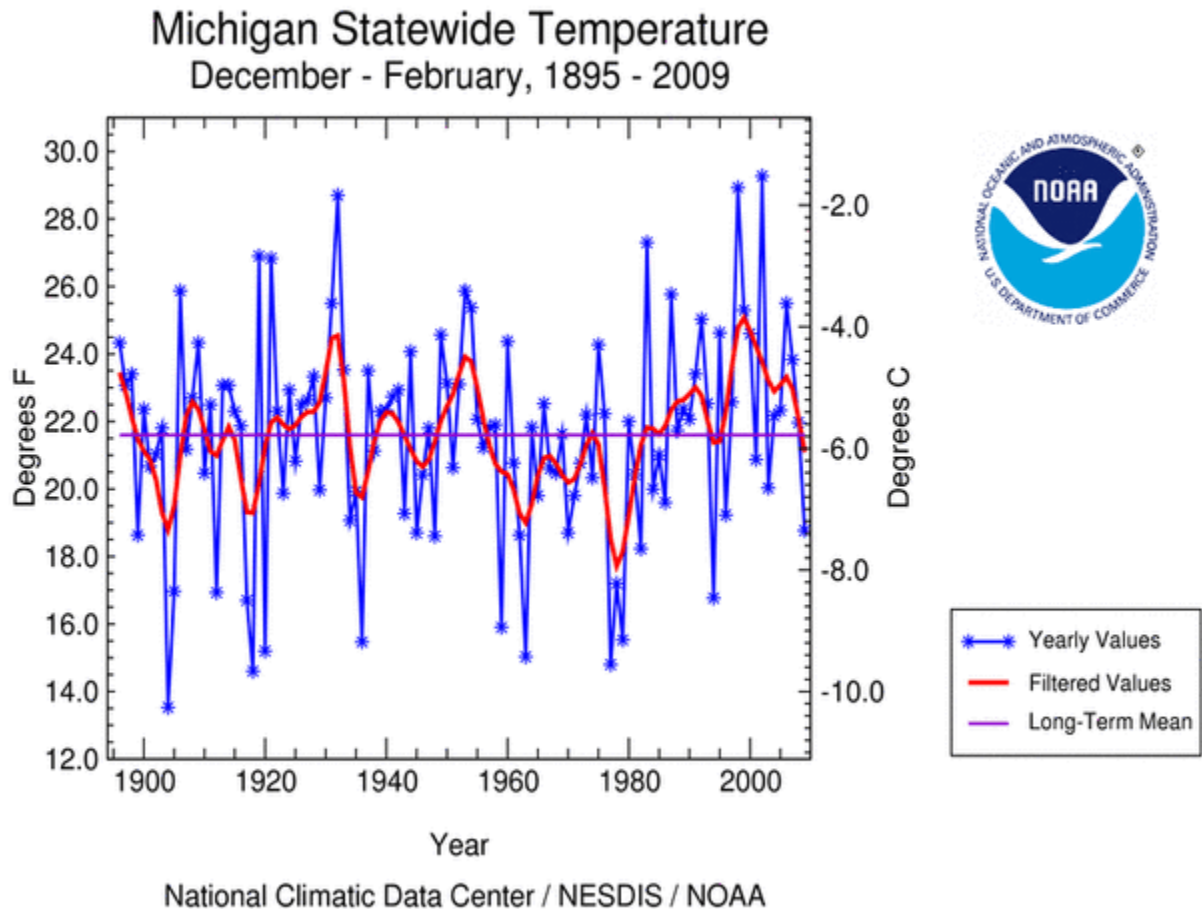


Figure 4. Winter temperature and temperature trend for Michigan from 1895 through 2009.

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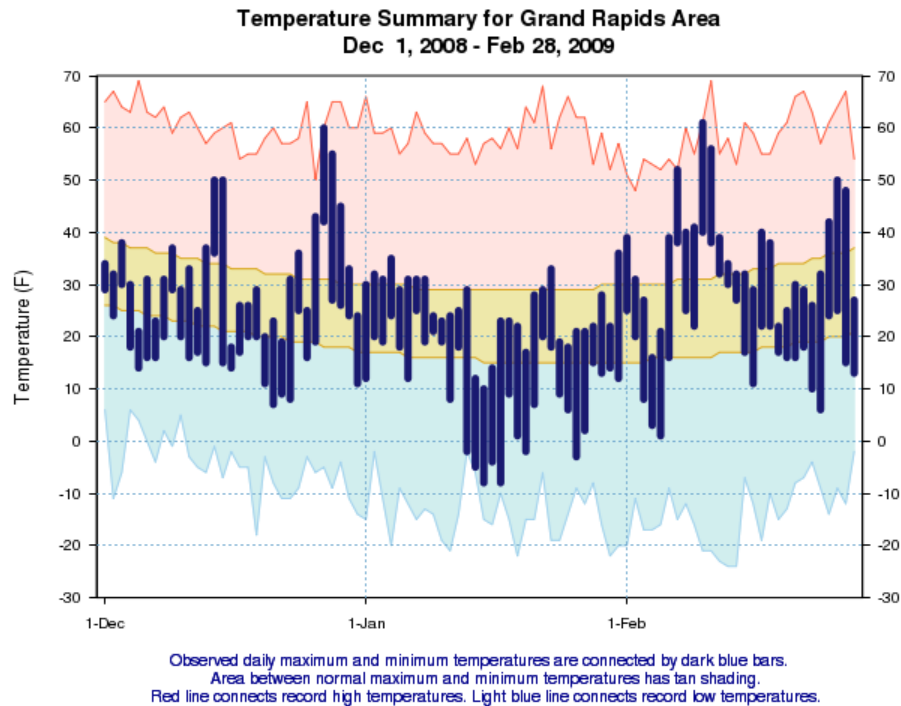


Figure 5. The 2008/2009 winter season daily temperatures for Grand Rapids.

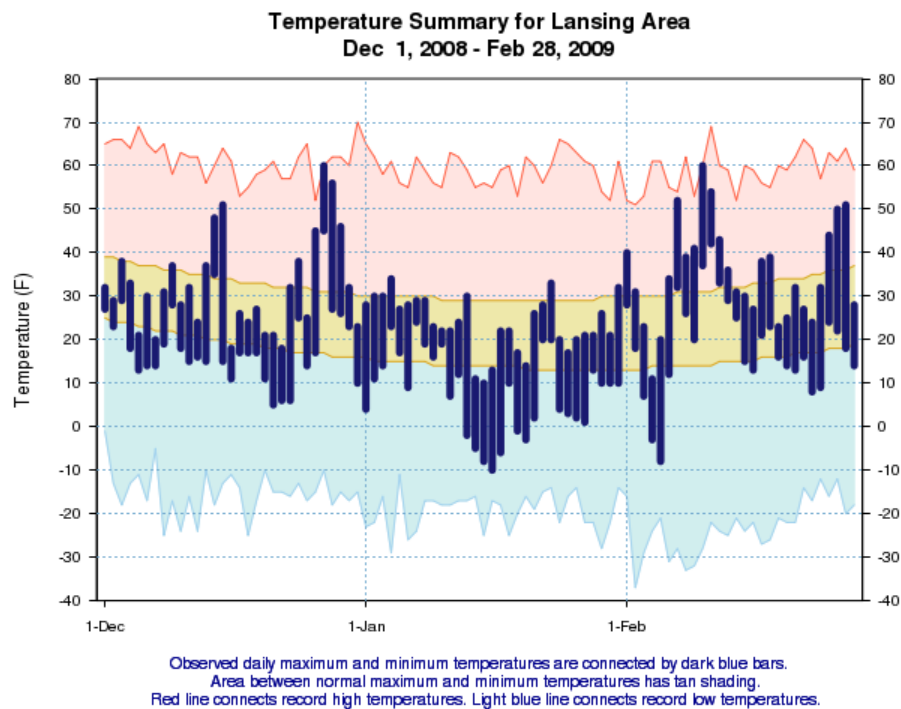


Figure 6. As in Figure 5, except for Lansing.

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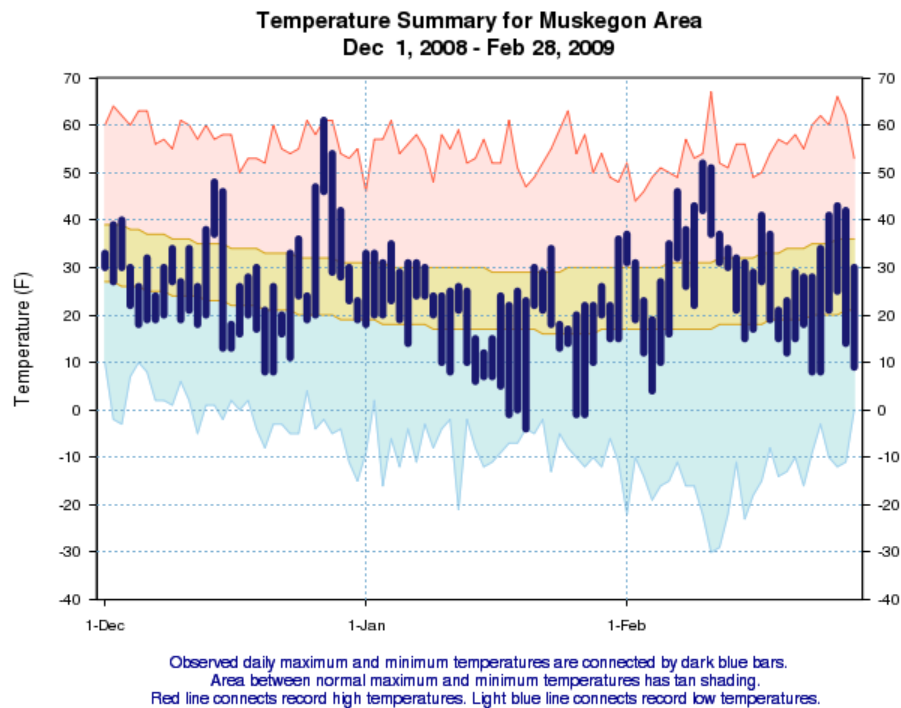


Figure 7. As in Figure 5, except for Muskegon.

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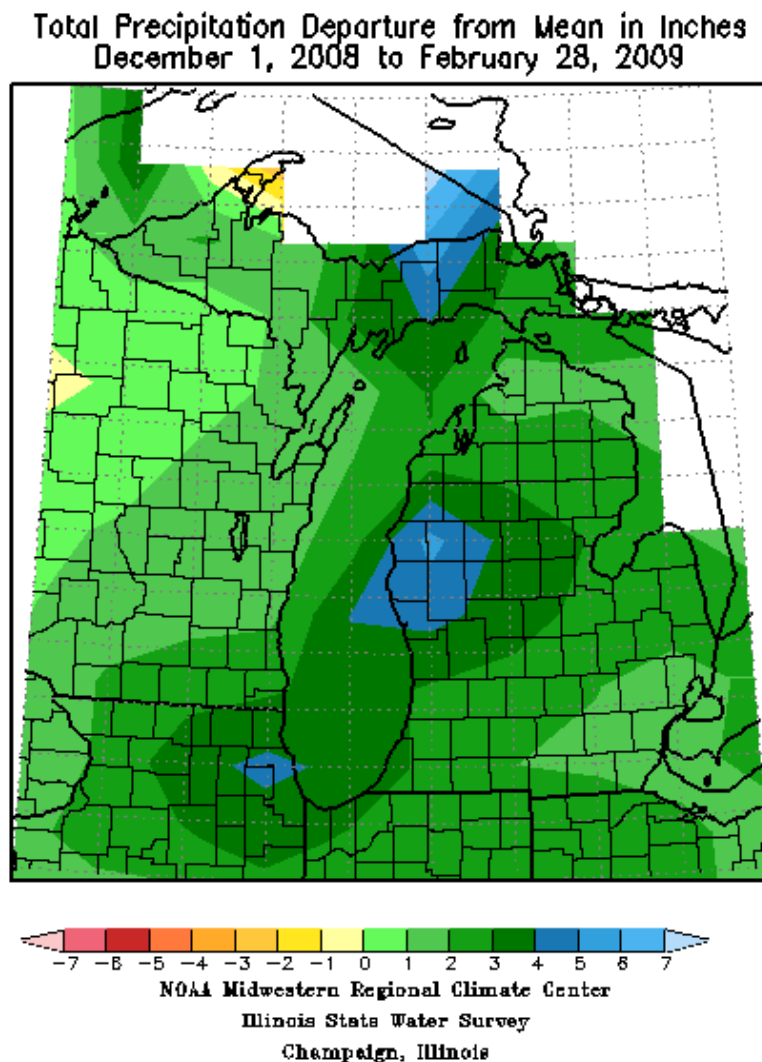


Figure 8. The winter 2008/2009 total precipitation departure from normal.

Precipitation was well above normal across Southwest Michigan, with most areas being two to four inches above normal (Figure 8). Some locations in West Central Lower Michigan were over seven inches above normal. Muskegon's 13.42 inches of precipitation was an all time record. Grand Rapids had the third wettest winter on record with 11.32 inches of precipitation. Area wide the winter of 2008/2009 was the 5th wet winter in a row (Figure 9). During the period of record (1895 to 2009) there has never been more than five consecutive wet winters in Southwest Lower Michigan. Similar to the coverage of colder than normal temperatures, wetter than normal conditions covered most of the northern Midwest and Great Lakes, with Michigan reporting the 14th wettest winter on record (Figure 10).

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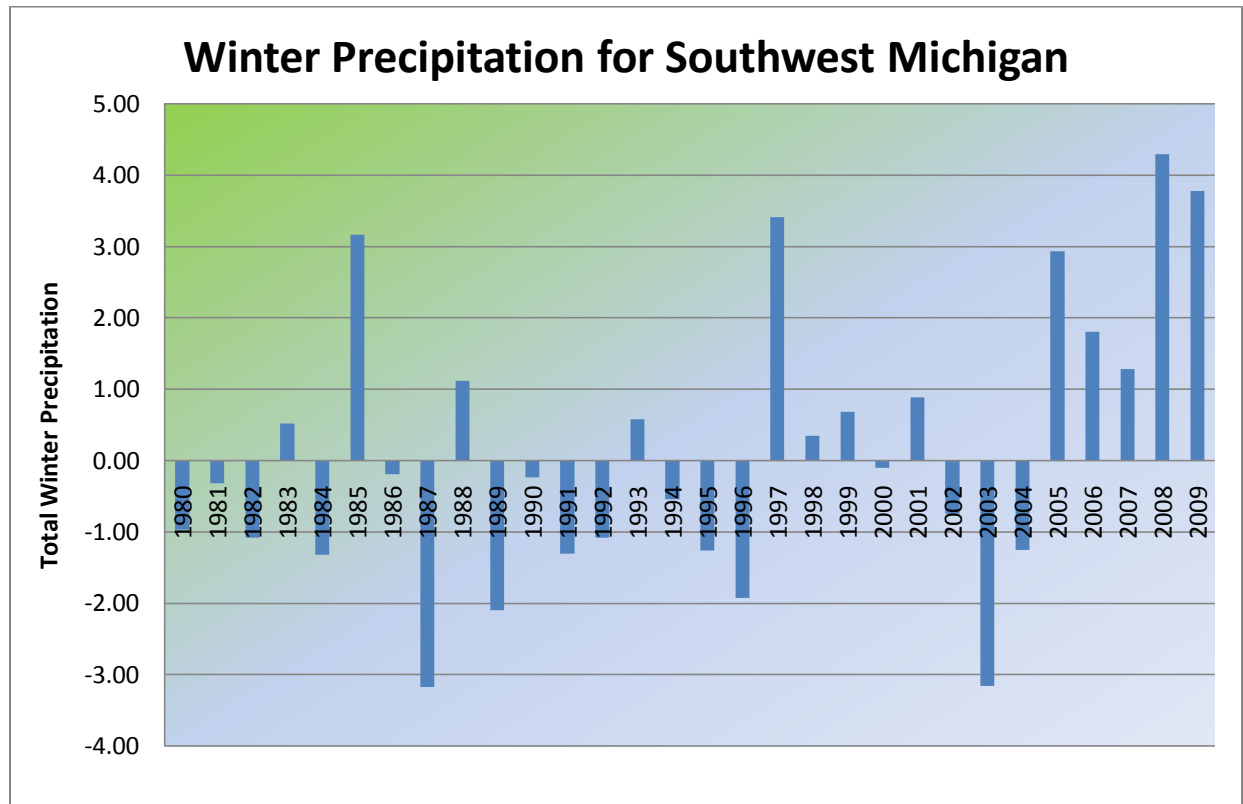


Figure 9. Total winter precipitation departure from normal for all of Southwest Lower Michigan.

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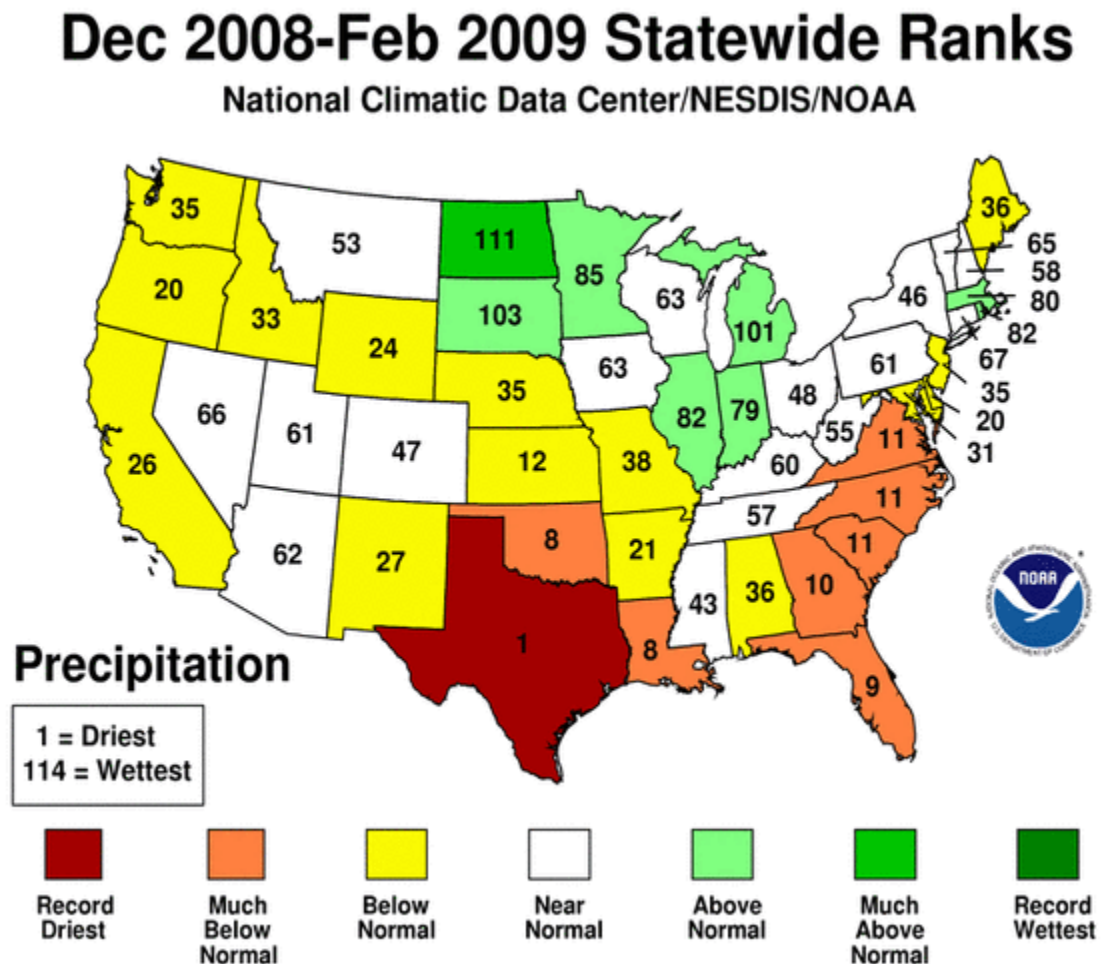


Figure 10 The NCDC precipitation ranking for the contiguous United States for the 2008/2009 winter season.

December had not only heavy snowfall but on the 26th, there also was a heavy rainfall with very warm temperatures. That caused the melting of most of the snow cover, which in many cases was well over a foot in depth (Figure 11). Significant flooding resulted, with up to 80 roads closed in Ottawa County. At one time, a section of US-31 was closed. Water was up to four feet deep across some roads. The road shoulder and pavement were washed out on several roads in Jamestown, Hudsonville and Conklin. Roads in several subdivisions across Ottawa County were submerged under two to three feet of water and there were reports of first floors of some homes being flooded. Severe flooding also occurred in the Village of Spring Lake, city of Grand Haven and across Spring Lake and Robinson Townships as the result of back water from an ice jam on the Grand River in Grand Haven. A damage assessment conducted by

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Ottawa County revealed that a total of \$270,500 worth of damage occurred to public infrastructure, with a total of \$3,292,400 worth of damage to private property. As a result of the widespread flooding, a local state of emergency was declared in Ottawa County. By December 28th, almost all of the snow cover was melted (Figure 12).

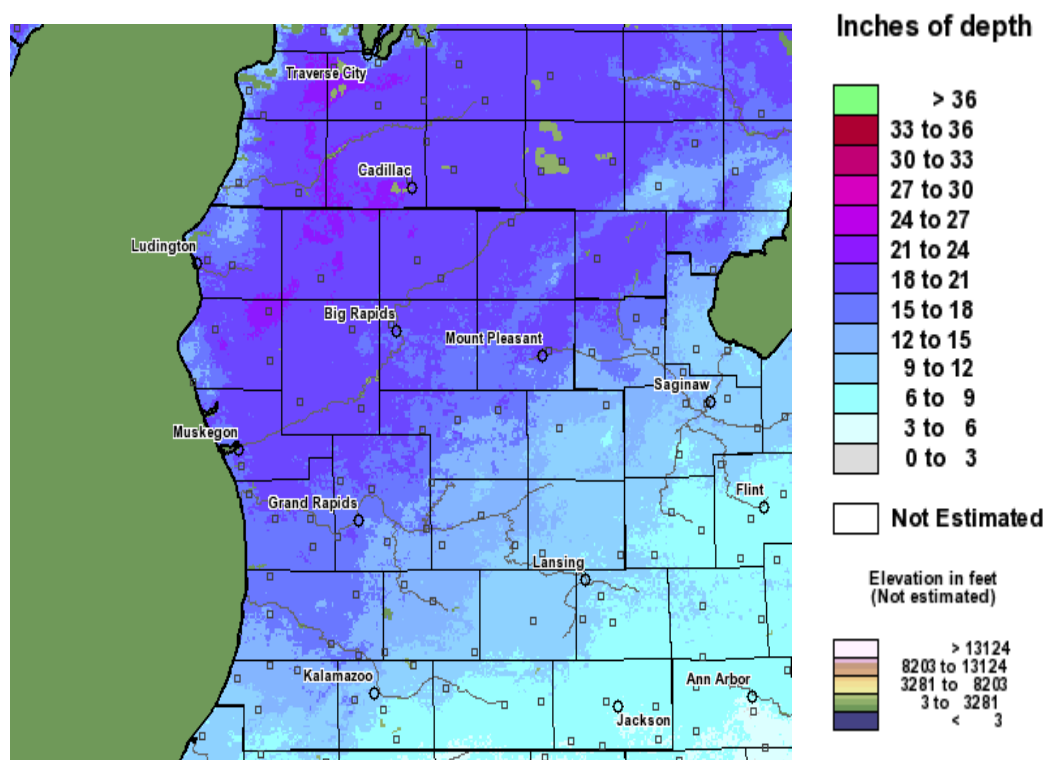


Figure 11. Snow Depth at 7 AM on December 26th 2008 (just as the heavy rain began on the 26th).

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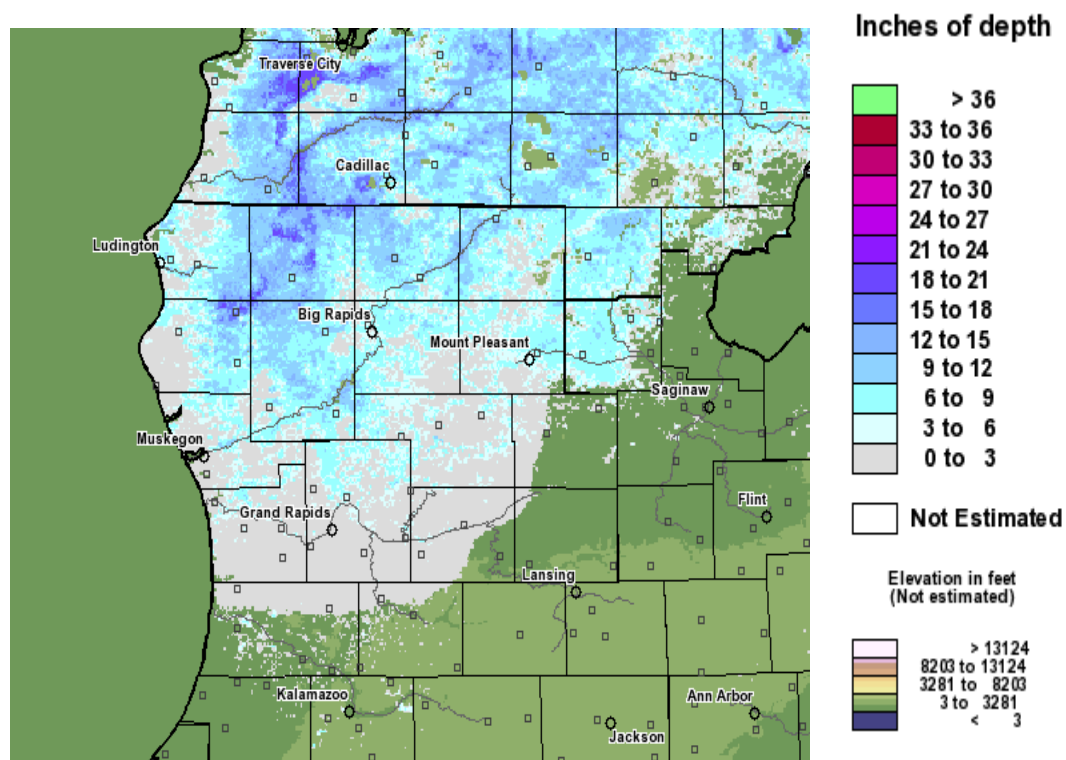


Figure 12. The snow depth on December 28th, 2009. That was one day after the heavy rainfall event.

In response to all of that melting snow and heavy rainfall (see rainfall map in the [December 2008 Climate Summary](#)), stream flows reached near record levels for the date (Figure 13). Most of the streams in Southwest Lower Michigan flooded. The river flow at the Ionia river gage (Figure 14) from December 1st 2008 through June 1st 2009, shows two large upward spikes in late December and during the second week in February. Note the peak late in December, which coincides with the runoff from the heavy rain and snow melt event at that time. Similarly, the river gage at Comstock (Figure 15) shows a similar rises occurring on the Kalamazoo River.

Another thaw during the second week in February also caused flooding, but not nearly as dramatic as the flooding in December. Note the peaks on stream flows just after the major snow melts in late December and the second week in February for both the Grand River at Ionia (Figure 13) and the Kalamazoo River at Comstock (Figure 14).

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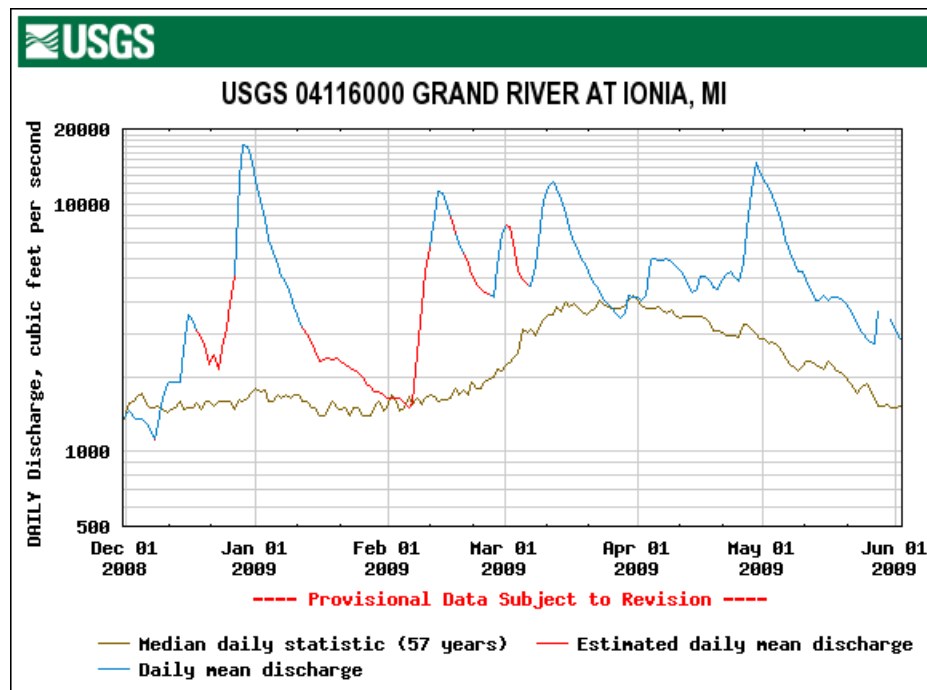


Figure 13. Stream Flows at Ionia Dec. 2008 through Jun 2009

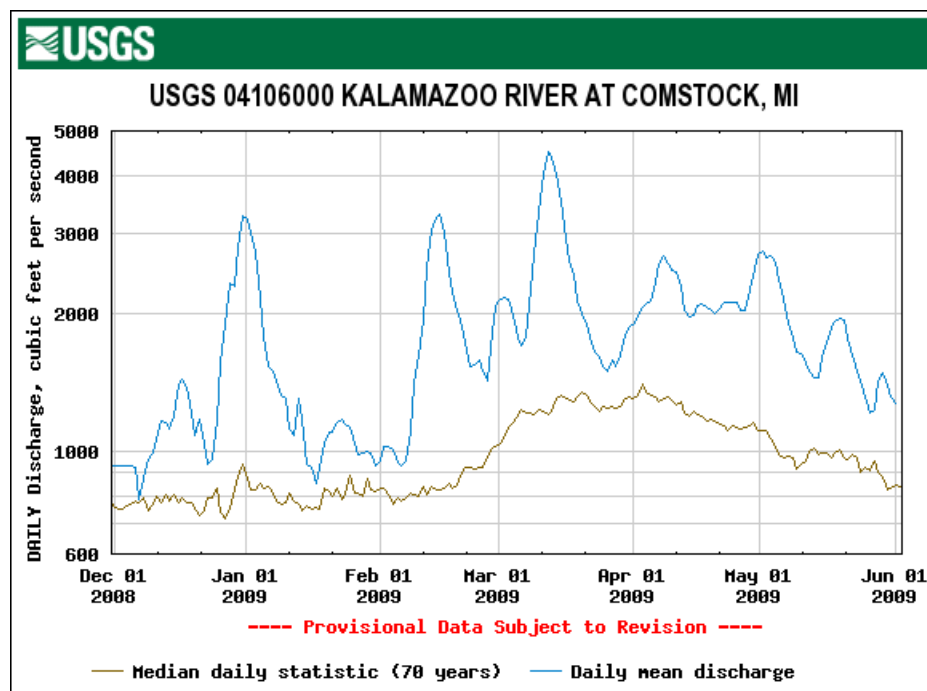


Figure 14. Stream Flows at Comstock Michigan Dec. 2008 through Jun 2009

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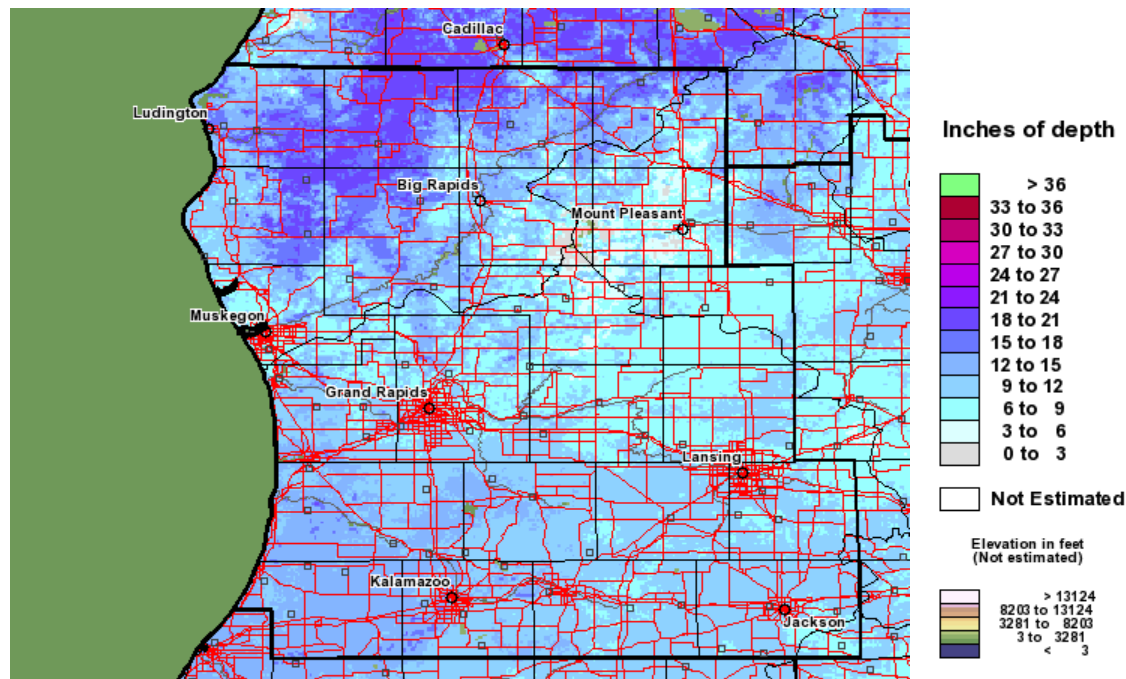


Figure 15. Snow depth on February 6th 2009 at 4 AM.

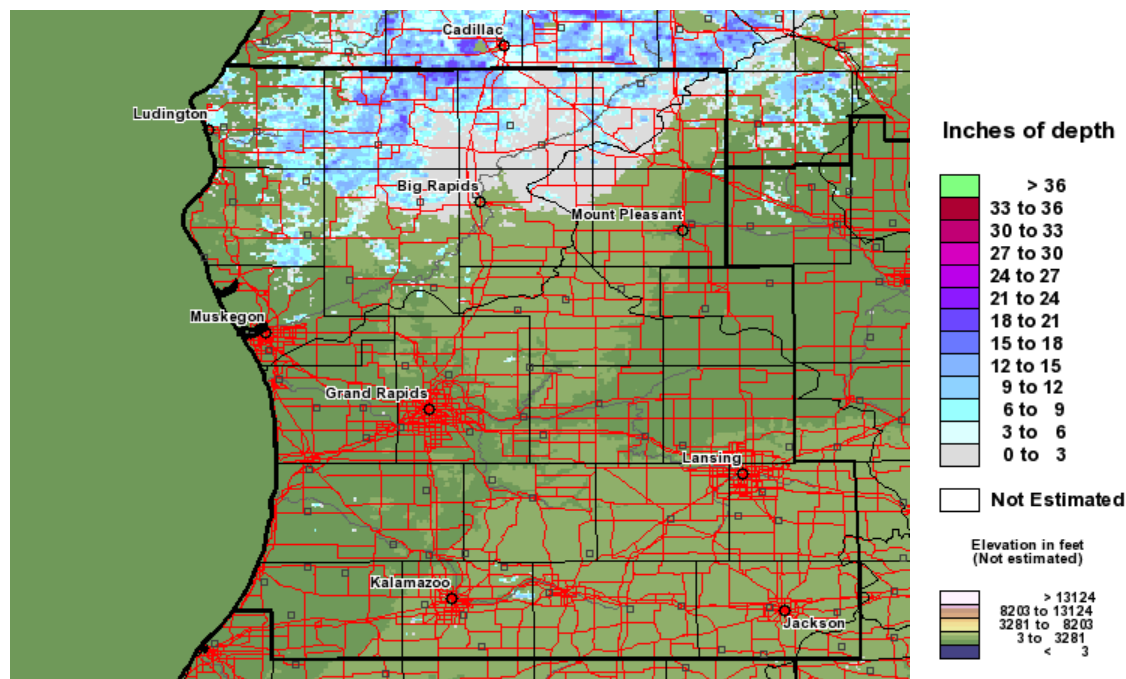


Figure 16.. Snow depth on February 12th, 2009 at 7 AM EST.

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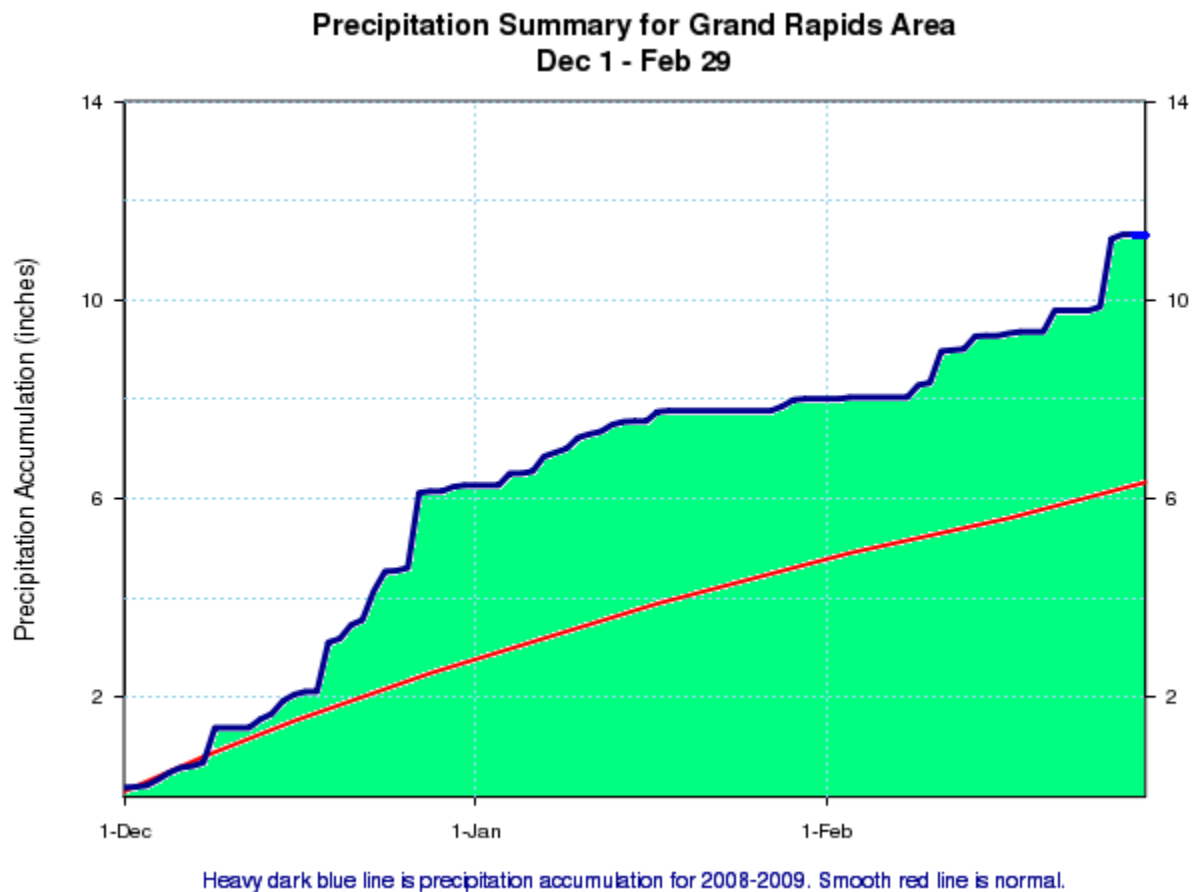


Figure 17. Grand Rapids daily precipitation accumulation for the winter of 2008/2009.

As seen in Figures 17-19, the wettest part of the winter was December. At Grand Rapids, about 55 percent of the total winter precipitation fell during the month of December alone. January was the driest month with less than 2 inches of precipitation falling in Grand Rapids. Just about all of the precipitation in January fell as snow in Grand Rapids. February had yet another heavy rain event on the 27th; Grand Rapids had 1.37 inches of rain that day. There was a peak in the river flow on the Iona river gage (Figure 14) around March 1st that resulted from this rainfall event. At that time there was little snow cover over most of the southern quarter of Southwest Lower Michigan.

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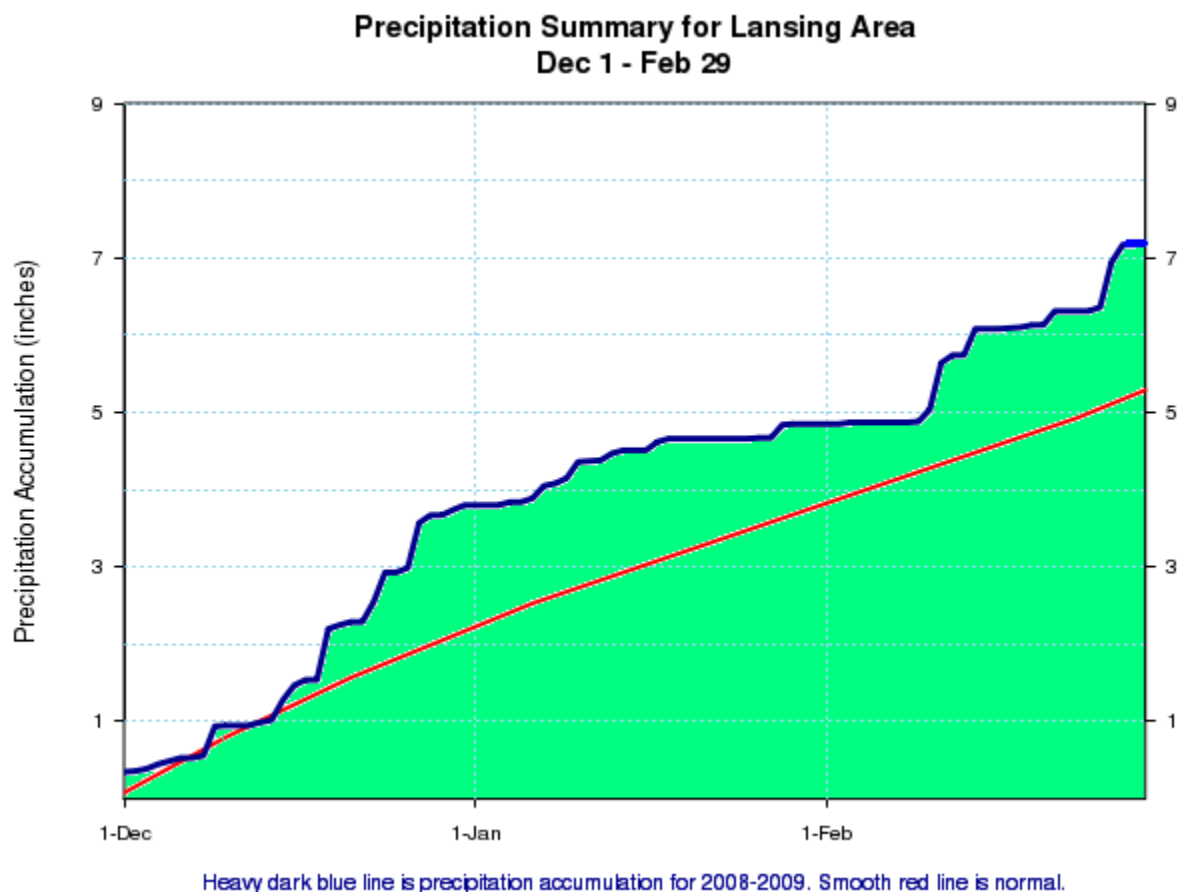


Figure18. As in Figure 17, except for Lansing.

Lansing showed a similar trend as Grand Rapids with most of the precipitation falling in December. January was the driest month the heaviest rainfall events occurred late in December and late in February. There was a peak in the river flow on the Kalamazoo River at the gage at Comstock (Figure 14) around March 1st that resulted from this rainfall event. In Lansing, the rainfall on the 26th of December, the 11th of February and the 26th of February were all around six tenths of an inch. These spikes can be seen on the Lansing Winter Precipitation accumulation chart (Figure 18).

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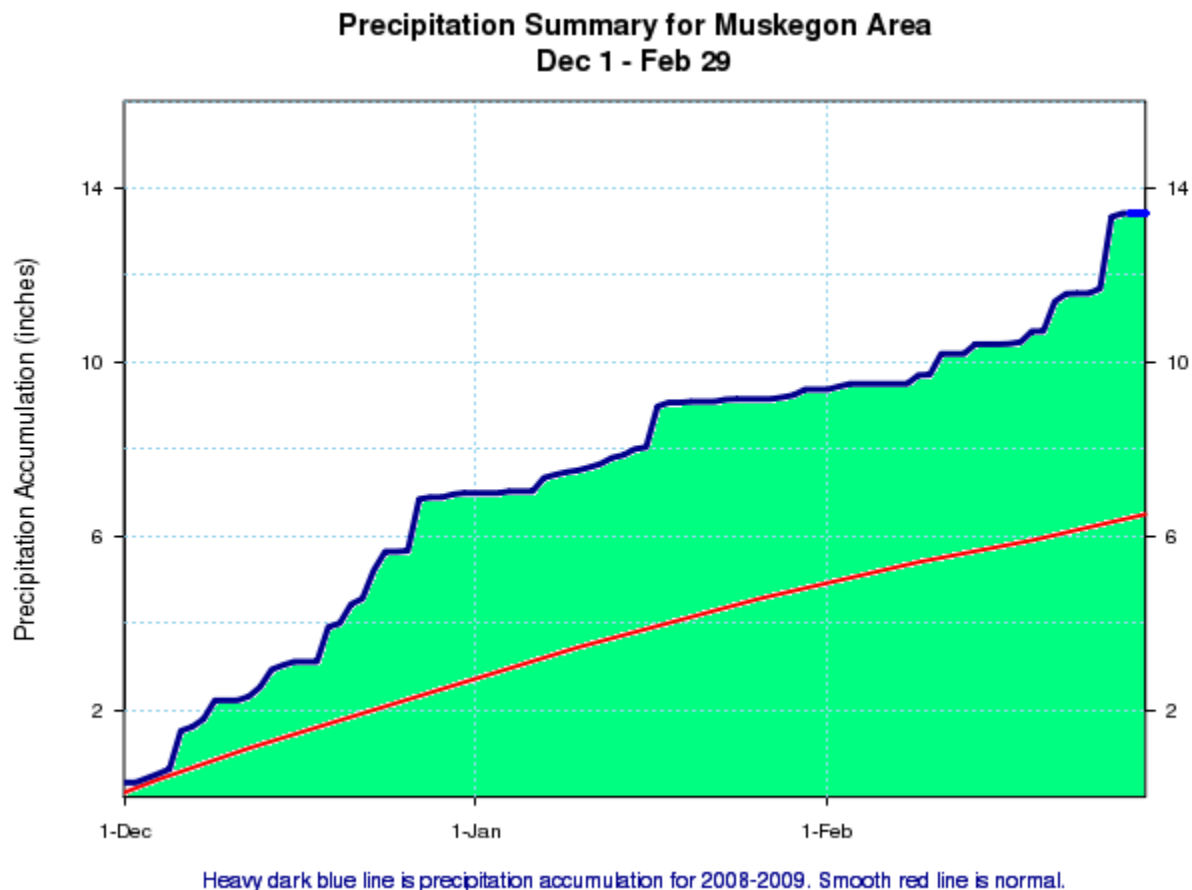


Figure19. As in Figure 17, except for Muskegon.

Muskegon showed a similar trend as Grand Rapids and Lansing with most of the precipitation falling in December. January was the driest month. The heaviest rainfall events occurred late in December and late in February. At Muskegon the heaviest rainfall event was the one at the end of February when 1.65 inches fell on the 26th. Note the spike in the rainfall total toward the end of February (Figure 19).

Snowfall this past winter was over 100 inches in most locations near and west of US-131 and north of Van Buren County (Figure 22). The actual snowfall reports ranged from 180 inches in Walkerville in Oceana County to 44 inches in Jackson (Table 2).

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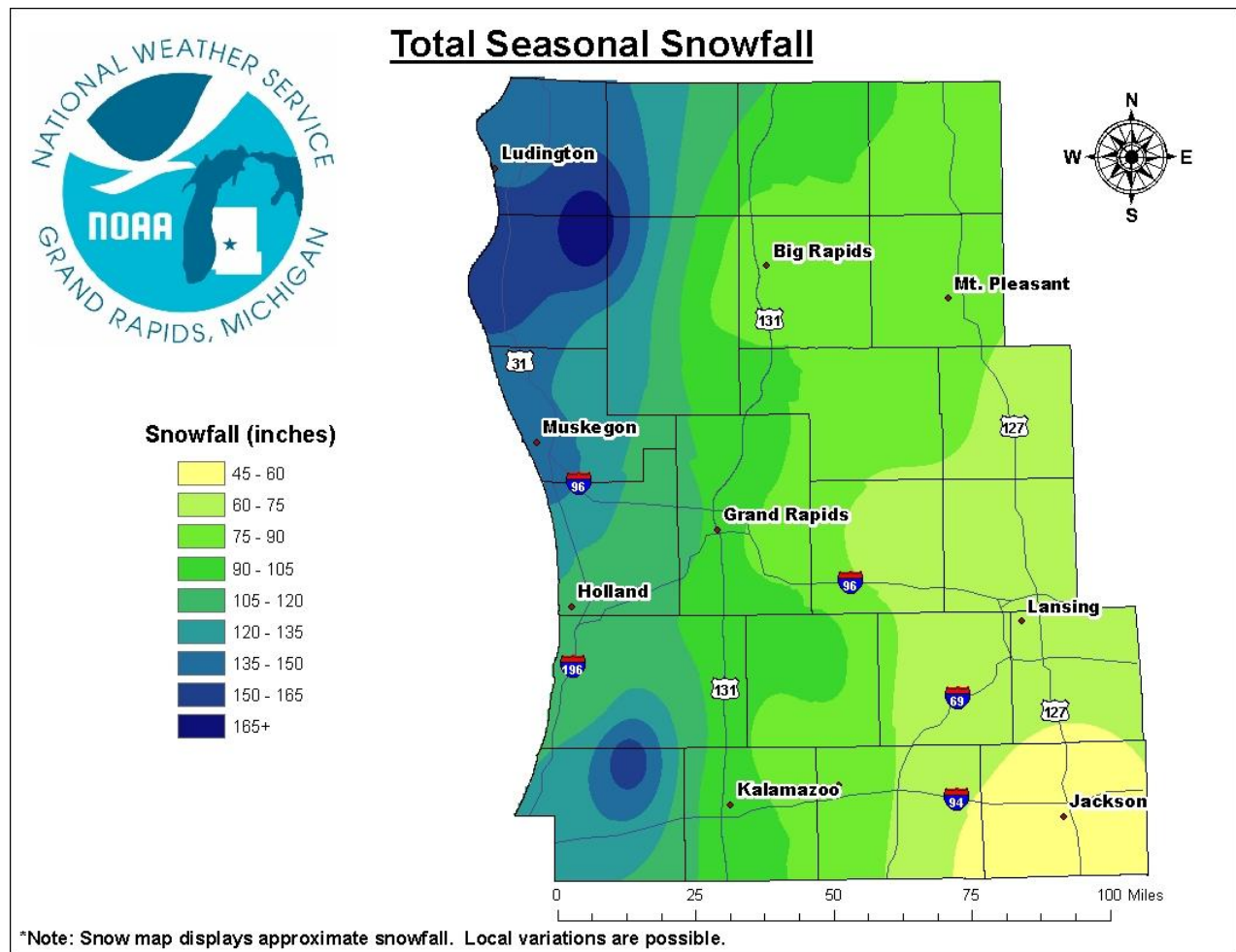


Figure 20. The total seasonal snowfall map for the 2008/2009 snowfall season for Southwest Michigan.

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TABLE 2. Below is a list of the season total snowfalls at selected climate sites across Southwest Michigan. The snowfall amounts are sorted in descending order.

1	Walkerville	189.0	inches
2	Hart	171.5	inches
3	Bloomingtondale	166.0	inches
4	Scottville	152.4	inches
5	Muskegon	148.2	inches
6	Hesperia	135.6	inches
7	Grandville	135.0	inches
8	Fremont	133.0	inches
9	Holland 3.9nne	122.5	inches
10	Walker 3.2w	118.4	inches
11	Fennville	109.6	inches
12	Hudsonville	106.1	inches
13	Grand Haven	105.2	inches
14	Grand Rapids	104.9	inches
15	Kalamazoo	103.9	inches
16	Newaygo	101.2	inches
17	Kentwood	100.1	inches
18	Hastings	99.9	inches
19	Cutlerville	98.2	inches
20	Montague	95.0	inches
21	Ada	88.2	inches
22	Mount Pleasant	80.5	inches
23	White cloud	80.4	inches
24	Gull Lake Bio	76.2	inches
25	Breckenridge	71.4	inches
26	Grand ledge	70.8	inches
27	Lansing	70.7	inches
28	Charlotte	69.1	inches
29	Ionia	68.6	inches
30	Alma	53.5	inches
31	Hanover 3.8w	49.0	inches
32	Jackson 3.2w	43.7	inches

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The snowfall for this past winter was well above normal across the area (Figure 20). Most locations north and west of Grand Rapids had snowfall amounts over 60 inches above normal. Several locations had record or near record snowfalls. At Grand Rapids, 94.5 inches of snow fell during the winter season (December through February). This was only 0.4 inches less than the record setting winter season snowfall last winter with 94.9 inches. For the entire snowfall season (July 1st through June 30th) the 104.9 inches that fell was the fourth snowiest on record. Curiously of the top 5 snowiest, only 2 were not within the past 10 years. Muskegon's 148.2 inches makes it the ninth snowiest on record. The last snow season that was snowier was the record setting season of 1981/1982, when 173.9 inches fell. Bloomingdale's 166 inches this past season goes down in history as their second snowiest, while 2006/2007's 178 inches remains in first place. Bloomingdale's records go back to 1904/1905. Hesperia's 136 inches puts the snow season of 2008/2009 in first place as the snowiest ever. Hesperia's records for snow go back to the 1938/1939 snowfall season. In Hastings, the 99.9 inches they reported puts this past winter in first place with last winter's 94.6 inches being in third place.

The 2008/2009 winter will not soon be forgotten. It was significantly colder, snowier and wetter than most of the winters over the past 20 years for Southwest Lower Michigan. It was more typical of what winters were like in the 1960s and 1970s.

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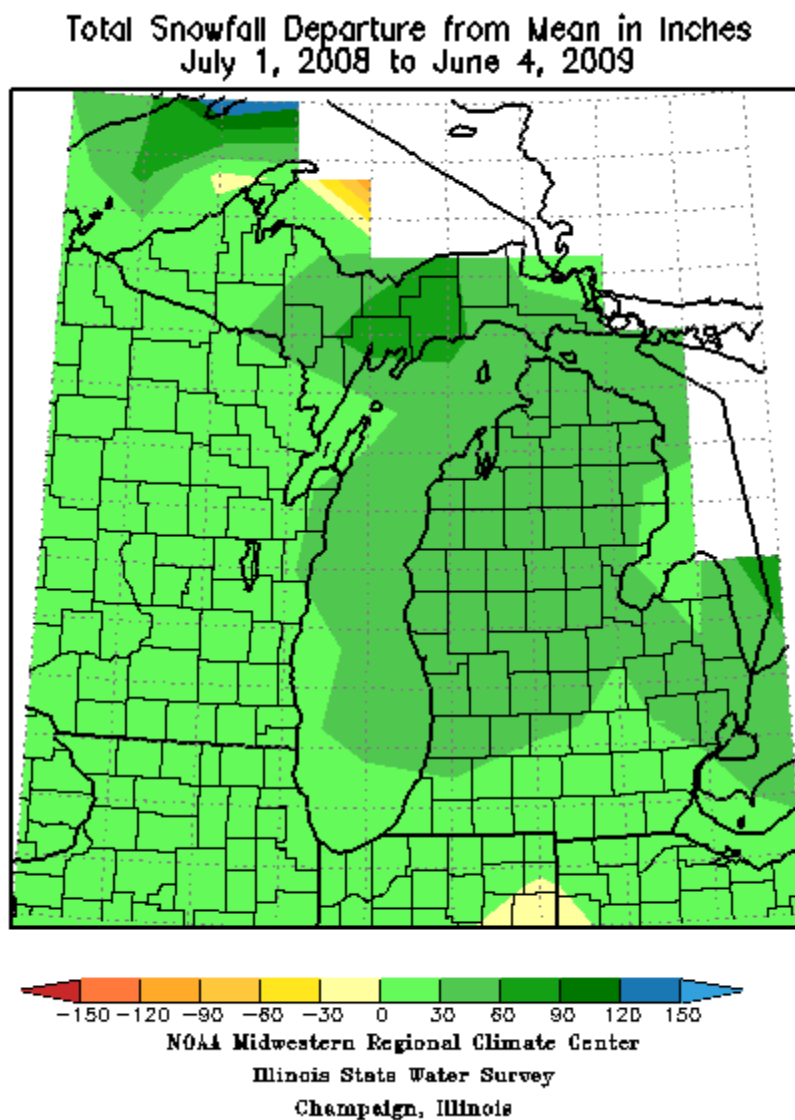


Figure 21. The 2008/2009 seasonal snowfall departure from the mean for Michigan.

For more details on the individual snow events and rainfall events see the monthly weather summaries listed below:

- ◆ [December 2008 Climate Summary](#)
- ◆ [January 2009 Climate Summary](#)
- ◆ [February 2009 Climate Summary](#)